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### (54) **Folding apparatus**

Falzapparat

Appareil de pliage

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## Description

This invention relates to chopper action folding apparatus particularly for high speed large capacity automated operation at the output end of continuous web fed printing or other processing plant.

From EP-A-0 462 421 a folding apparatus according to the preamble of claim 1 is known.

The object of the invention is to provide folding apparatus which is reliable, efficient and adaptable in operation and which is particularly suited to highly automated control systems for precision high speed operation and having facility for simple and speedy changeover by remote control of operating modes.

According to the invention there is provided chopper action folding apparatus including:

- a) conveyor means for carrying a stream of successive multi or single sheet pre-folded or non-folded signatures along a feed path,
- b) a headstop formation having an abutment face which can operatively be positioned in said path to limit forward travel therealong of each signature,
- c) a chopper element guided for oscillating movement into and out of intersecting relationship with the feed path in a folding zone thereof which extends upstream from the abutment face,
- d) a pair of folding elements defining a nip immediately adjacent to said zone for receiving and removing a signature tucked facewise into said nip,
- e) chopper drive means operating the chopper element in phased relationship to the delivery of each signature to said zone to institute folding or further folding thereof by tucking it into said nip, and
- f) braking means in said zone for substantially slowing or stopping forward movement of each signature as it nears or reaches the abutment face to be acted on by the chopper element; characterised in that said apparatus further includes
- g) control means including position sensing means in or adjacent the folding zone operatively detecting the relative positions of the abutment face and the approaching or halted leading edge of each successive signature in said zone, and regulating means automatically adjusting the effect of the braking means on the signatures in use in response to readout from the sensing means whereby the chopper element acts on each signature at an optimum position in said zone at which the leading edge is so related to the abutment face that the signature is undamaged and is effectively and accurately folded.

Preferably the sensing means comprises a pair of position sensors at respective positions spaced laterally of the feed path and independently responsive to the relative positions of respective spaced parts of said abutment face and signature leading edges, the individ-

ual readouts therefrom also being automatically compared to detect skewing of the leading edges and/or of the abutment face.

Conveniently the sensing means or each said sensor thereof comprises an infra-red detector on one side of the feed path and a light source on the other side, the detector and light source extending longitudinally of the feed path so that the degree of cut off of light reaching the detector is a direct function of said relative positioning.

Said infra-red detector may incorporate a longitudinally extending row of individual detector cells, the number of said cells activated at any time being a direct function of said relative positioning.

The braking means may conveniently include one or more brush elements acting on a face or faces of the signatures in the folding zone in known manner, the regulating means acting to adjust the pressure of the brush element or elements on said face or faces to vary their frictional braking effect thereon.

The regulating means may further include timing means whereby not only said relative positioning of the abutment face and leading edge is detected but also the velocity at which the leading edges approach the abutment face and/or the rate at which the leading edges are being de-accelerated by the action of the braking means with consequent feedback adjustment of the latter.

An example of the invention is now more particularly described with reference to the accompanying drawings wherein:-

Figure 1 is a diagrammatic perspective view of folding apparatus with some parts omitted for clarity, Figure 2 is a like diagrammatic view including position sensing means, and Figure 3 is a diagrammatic longitudinal section view of part of said apparatus.

The chopper action folding machine incorporates generally conventional folding mechanism of which the basic components are shown in Figure 1. Flights of rotatably driven spaced parallel upper and lower tapes 10 running from right to left as viewed in the drawings carry a stream of successive signatures 12, typically from the output end of a high speed continuous web printing press. The signatures 12 shown for example have already been cut and single folded transversely of the feed direction in conventional cylinder web handling apparatus of the press, the folded transverse edge 14 of each signature leading in their direction of travel along the feed path. Each signature may be single or multi-sheet and need not necessarily have been pre-folded if only a fold longitudinally of said direction of travel is required, or they may have been pre-folded more than once prior to delivery to this machine.

The latter form of folding is achieved when each signature reaches a folding zone 16 indicated by the arrow so designated in Figure 1, the downstream end of

said zone being defined by the abutment face 18 of a headstop 20 positioned transversely across the feed path. Headstop 20 is notched so that tapes 10 run therethrough but the approaching signatures 12 cannot pass it.

Immediately upstream of headstop 20 and positioned centrally immediately below the feed path in folding zone 16 are a pair of folding rolls 22 defining a central nip longitudinally of the feed path and rotatably driven so that sheet material tucked into the nip will be engaged thereby and drawn out of the feed path to be delivered downwardly to further onward conveyor means not shown. Typically rolls 22 are knurled and include grooves carrying further conveying tapes.

Acting in conjunction with rolls 22 is a vertical chopper blade 24. Blade 24 is guided for vertical movement into and out of intersection with the feed path in alignment with the nip between roll 22 and is operated by conventional drive means not shown in the drawings, typically a rotating crank and connecting rod arrangement. Other forms of chopper element may be used e.g. reciprocating or "pecking" action choppers. Operation of chopper blade 24 is phased with the signature feed so that it is lowered to engage the top face of each signature 12 as it arrives fully in the folding zone 16 with leading edge 14 at or in close proximity to abutment face 18. The longitudinal folding of each signature is initiated by the lower edge of blade 24 as the lower face of the signature is tucked into the roll nip. As soon as it is engaged by the latter it is drawn downwardly and the fold is fully formed by the pressure of rolls 22. In the meantime chopper blade 24 has been raised ready for the next cycle.

A typical high speed web printing press operates at a throughput speed of over 12 metres per second producing over 72 thousand copies per hour, thus it will be appreciated that each stream of signatures 12 must be moved rapidly away from the press and must be handled and processed with the greatest possible speed, accuracy and reliability. Any malfunctioning at the output end could involve close down of the entire printing line with consequent waste of time and materials. It is also important that any necessary adjustments can be made easily and accurately while the system is running at full speed and preferably by remote control with full and easily comprehensible read-out of operating parameters and clear warning of any faults or malfunction.

Reverting to the folding operation itself, each signature 12 as it reaches the folding zone 16 must be brought to a halt or near standstill to enable it to be folded and removed from the feed path without it being damaged by forceful collision with headstop 20 and to ensure that the fold is properly and accurately formed. The apparatus therefore includes braking means (not shown in Figures 1 and 2) which includes brushes 26 positioned in the folding zone to bear frictionally on the upper, and possibly the lower, faces of the signatures between tapes 10 on each side of chopper blade 24. The friction of brushes 26 brings each signature to a

halt or near halt as folding takes place. The braking pressure can be adjusted by varying the brush pressure through a servo unit 28 respective to each brush or group of brushes. In practice close and frequent adjustment of braking force is needed because the speed of feed through conveyor tapes 10 may vary, different papers and/or inks and variations in thickness, e.g. number of sheets, affect the frictional response of the signatures themselves, and the brushes are subjected to wear. Brushes 26 are spring loaded to protect against damage if there should be an accidental build-up of signatures or sheets.

Chopper blade 24 may also contribute to the braking effect, in which case it may be regarded as part of the braking means because it also frictionally engages the top face of the signature while it may still be on the move and this is another factor affecting the braking force required. In some known forms of folding apparatus the chopper blade and/or the other chopper or folding elements serve as the braking means alone and the braking effect may be adjusted by regulating the phasing of their folding action.

In other known constructions other forms of braking means have been employed, for example air braking using suction boxes acting on the signature in the folding zone, the braking effect being regulated by altering the level of vacuum applied therein.

The apparatus further includes control means 30 which incorporates position sensing means shown diagrammatically in Figure 2 and 3.

Said means incorporate position sensing means comprising a pair of infra-red detector units 32, in this example located immediately below the feed path at the upstream end of the folding zone 16 just below and extending longitudinally downstream from abutment face 18 of headstop 20. Units 32 are spaced laterally apart to each side of the centre of the feed path.

Each unit 32 comprises a row of individual infra-red detectors, for example 14 in number pitched at 1mm intervals longitudinally of the feed path.

An infra-red light source 34 is positioned above the feed path relative to each unit 32, the emission therefrom being directed downwardly to shine over and somewhat beyond the full area of the respective unit 32. In some constructions it may be preferred to arrange units 32 above the feed path with the light sources below it.

The signal from each individual cell of each unit 32 is fed to a signal module 34 of control means 30 where the signals are processed, the output therefrom being applied through a regulating module 36 to operate the servo units 28 which adjust the braking pressure of brushes 26, and also to provide a visual read-out of operating conditions on a display screen at a control station 38.

A lefthand group of the individual infra-red cells of units 32 reads the position of the abutment face 18 and also, as there are two laterally spaced units, provide a

check of whether said face is at right angles across the feed path or skewed.

At the same time the remaining cells in each unit respond to the position of the leading edge of each signature as it slows and nears face 18, the number of cells left unobscured from light source 34 by either headstop 20 or the respective signature 12 giving a measure of the relative positions of face 18 and leading edge 14. The closest approach of each leading edge 14 to face 18 (it may actually touch) is read in synchronization with the timing of the action of chopper blade 24, typically when the blade is a few degrees from bottom dead centre. As the signature is drawn through rolls 22 the sensors detect the disappearing back edge of the signature, a further indication of the operating sequence.

Moreover the rate at which successive cells are obscured by the travelling leading edge 14 as it crosses each module can provide a measure, in conjunction with a timing means of processing module 34, of the speed of approach of each signature towards headstop 20 and its rate of de-acceleration as it is brought to a halt or near standstill.

At one extreme, if all the cells of both units are obscured almost instantaneously it will be an indication that the braking means is not operating effectively and the signature has crashed with some force into headstop 20 with probable damage resulting in a defective folded copy. The braking force will be automatically increased until this is remedied, the control means 30 will preferably store and compare the signals resulting from successive signatures to detect the rate and effectiveness of automatic adjustments made to the braking means.

If no cells are obscured (apart from those covered by the headstop 20) during a folding cycle this will be an indication that the signature has failed to reach units 32 because some misfeed has taken place or because excessive braking force has been applied and again automatic correction, probably coupled with visual indication on the screen at control station 38, will be made.

Another cause of mis-folding is if signatures arrive at the folding zone out of line or skewed, or with individual sheets or pages misplaced. The use of the two spaced detector units 32 gives a check of correct leading edge presentation, if one unit has more cells obscured than the other the leading edge is skewed or misaligned.

Provision is preferably included for sensing the intensity of the light reaching units 32 in operation and increasing the intensity up to a limit if necessary. This compensates for ageing of the lamps and/or sensor units 32; possible contamination e.g. by dust; and variations in paper type, thickness, surface finish, ink coverage etc.

The regulating module 36 may include provision for setting the rate at which changes are made to operating parameters, in particular the rate of adjustment of brush pressure, proportional to the degree of error detected. A

large error detected by units 32 will result in initial larger and faster adjustment of servo units 28 but as the error is reduced the adjustments made will become much finer so as to avoid, as far as possible, hunting in the control loop. Comparison and averaging of successive read-outs from the detector units 32 also assists in fine and effective accurate adjustment.

While the invention has been described in relation to a brush-type braking means it will be appreciated that it can be applied to other forms of braking means such as the vacuum box braking referred to above and/or the adjustment of the braking force arising from operation of the chopper blade or other chopper and/or folding elements of the apparatus or some combination of said braking elements and effects.

It will also be appreciated that forms of position sensing means other than the infra-red units described above could be employed.

In some modes of operation the folding action at a given chopper folding apparatus which is part of a printing or other processing plant may not be required. Thus provision may be made for raising headstop 20 out of the feed path and holding chopper blade 24 in its raised position so that signatures pass straight through the folding zone 16 unaltered. It may still be useful to keep detector units 32 in operation as they will read any skewed misfeed of signatures passing them and they may also provide a feed out of their transport speed at that position.

The display provided to the operator at the control station 38 derived from the output from the sensing means, and from other read out from the control and other systems of the machine will preferably be in an easily understood graphic or picture format along with numerical indications and may show how near each leading edge 14 is approaching headstop 20; degree of skew; delivery speed; presence or absence of signatures; degree of adjustment being made by the automatic control loop etc.

## Claims

### 1. Chopper action folding apparatus including:

- a) conveyor means (10) for carrying a stream of successive multi or single sheet pre-folded or non-folded signatures (12) along a feed path,
- b) a headstop formation (20) having an abutment face (18) which can be operatively positioned in said path to limit forward travel therealong of each signature (12),
- c) a chopper element (24) guided for oscillating movement into and out of intersecting relationship with the feed path in a folding zone (16) thereof which extends upstream from the abutment face,
- d) a pair of folding elements (22) defining a nip immediately adjacent to said zone for receiving

- and removing a signature (12) tucked facewise into said nip,  
 e) chopper drive means operating the chopper element in phased relationship to the delivery of each signature (12) to said zone (16) to institute folding or further folding thereof by tucking it into said nip, and  
 f) braking means (26) in said zone for substantially slowing or stopping forward movement of each signature (12) as it nears or reaches the abutment face (18) to be acted on by the chopper element (24);  
 characterised in that said apparatus further includes  
 g) control means (30) including position sensing means (32) in or adjacent the folding zone (16) operatively detecting the relative positions of the abutment face (18) and the approaching or halted leading edge (14) of each successive signature (12) in said zone, and regulating means (36,28) automatically adjusting the effect of the braking means (26) on the signatures (12) in use in response to readout from the sensing means (32) whereby the chopper element (24) acts on each signature (12) at an optimum position in said zone (16) at which the leading edge (14) is so related to the abutment face (18) that the signature (12) is undamaged and is effectively and accurately folded.
2. Apparatus as in Claim 1 characterized in that the sensing means comprises a pair of position sensors (32) at respective positions spaced laterally of the feed path and independently responsive to the relative positions of respective spaced parts of said abutment face (18) and signature leading edges (14).
  3. Apparatus as in Claim 2 characterized by means (34) for automatic comparison of the individual read-outs from said position sensors (32) to detect skewing.
  4. Apparatus as in Claim 2 or 3 characterized in that each said sensor (32) comprises an infra-red detector on one side of the feed path and a light source (34) on the other side.
  5. Apparatus as in Claim 4 characterized in that said detector (32) and light source (34) both extend longitudinally of the feed path so that the degree of cut off of light reaching the detector is a direct function of said relative positioning.
  6. Apparatus as in Claim 5 characterized in that said detector (32) incorporates a longitudinally extending row of individual detector cells, the number of cells activated at any time being a direct function of said relative positioning.
  7. Apparatus as in Claim 6 characterized in that an end group of each row of cells serves to read the position and lateral alignment of the abutment face (18).
  8. Apparatus as in Claim 6 or 7 characterized in that cells in each row serve to respond to the position of the leading edge (14) of each signature (12) relative to the position of the abutment face (18).
  9. Apparatus as in Claim 6, 7 or 8 characterized by including timing means (34) operatively responding to the rate at which successive cells in each row are obscured by the moving leading edge (14) to provide a measure of the speed of approach and/or deceleration of the signature (12).
  10. Apparatus as in any preceding claim characterized in that the braking means includes one or more brush elements (26) acting on a face or faces of the signatures (12) in the folding zone (16), said regulating means acting to adjust the pressure of said element or elements for varying the braking effect in use.
  11. Apparatus as in any one of Claims 1 to 9 characterized in that the braking means includes air suction boxes operatively acting on the signature (12) in the folding zone (16), said regulating means (36) acting to adjust the level of vacuum applied for varying the braking effect in use.
  12. Apparatus as in any preceding claim characterized in that the headstop formation (20) and chopper element (24) can be selectively held clear of the feed path so that signatures (12) can be fed through the folding zone (16) without folding taking place, the position sensing means (32) serving to monitor their passage through said zone.
- Patentansprüche**
1. Falzapparat mit Schlagelementeinsatz, enthaltend
    - a) eine Transportvorrichtung (10) zum Transport von ständig nachgelieferten, hintereinander angeordneten, aus wenigstens einem Bogen bestehenden vorgefalteten oder ungefalteten Druckprodukten (12) entlang eines Vor- schuttpfades:
    - b) einen Bewegungsbegrenzer (20) mit einer Anschlagstirnseite (18), der im Betrieb auf diesem Pfad ausgerichtet werden kann, um die Vorwärtsbewegung jedes Druckproduktes (12) auf diesem Pfad zu begrenzen;
    - c) ein Schlagelement (24), das schwingbeweglich so geführt wird, daß es in einem Falzbe-

reich (16), der sich stromaufwärts der Anschlagstirnseite (18) des Vorschubpfades befindet, mit dem Vorschubpfad in Überschneidung kommt bzw. sich wieder von diesen wegbewegt;

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d) ein Paar von Falzelementen (22), die direkt angrenzend an diesen Bereich einen Knick bilden, in dem das Druckprodukt (12), das mit der Außenseite in diesen Knick gedrückt wird, aufgenommen und durch den es abtransportiert wird; und

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e) eine Schlagelementantriebsvorrichtung, die das Schlagelement phasenverschoben zum Transport jedes Druckproduktes (12) in diesen Bereich (16) antreibt, um ein Falzen bzw. ein weiteres Falzen des Druckproduktes durch ein Hineindrücken des Druckproduktes in den Knick in Gang zu setzen;

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f) eine Bremsvorrichtung (26) zum weitgehenden bzw. vollständigen Abbremsen der Vorwärtsbewegung jedes Druckproduktes (12) in diesem Bereich, wenn dieses sich der Anschlagstirnseite (18) nähert bzw. diese erreicht, damit das Schlagelement (24) auf das Druckprodukt einwirken kann (18);

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dadurch gekennzeichnet, daß der Apparat weiterhin folgende Vorrichtungen umfaßt:

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g) eine Regelvorrichtung (30), enthaltend eine Positionssensoreinrichtung (32) in oder nahe dem Falzbereich (16), die im Betrieb die Relativlage der Anschlagstirnseite (18) zur sich nähernden bzw. angehaltenen Vorderkante (14) jedes aufeinanderfolgenden Druckproduktes (12) in diesem Bereich ermittelt, sowie Reguliervorrichtungen (36, 28), die die Wirkung der Bremsvorrichtung (26) auf die verwendeten Druckprodukte (12) automatisch in Abhängigkeit zur Anzeige der Sensoreinrichtung (32) einstellt, wodurch das Schlagelement (24) auf jedes Druckprodukt (12) einwirkt, wenn dieses in diesem Bereich (16) optimal ausgerichtet ist, wobei die Vorderkante (14) zur Anschlagstirnseite (18) so zu liegen kommt, daß das Druckprodukt (12) nicht beschädigt und wirksam und genau gefalzt wird.

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2. Apparat nach Anspruch 1, dadurch gekennzeichnet, daß die Sensoreinrichtung ein Paar von Positionssensoren (32) enthält, die an jeweiligen Stellen seitlich mit Abstand zum Vorschubpfad angeordnet sind und unabhängig voneinander auf die Relativlage der jeweiligen mit Abstand zueinander angeordneten Teile der Anschlagstirnseite (18) und der Druckproduktvorderkanten (14) reagieren.

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3. Apparat nach Anspruch 2, gekennzeichnet durch eine Vorrichtung (34) zum automatischen Vergleichen der einzelnen Ausgangssignale von den Positionssensoren (32), um eine Schrägstellung zu ermitteln.

4. Apparat nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß jeder Sensor (32) einen Infrarot-Detektor auf der einen Seite des Vorschubpfades sowie eine Lichtquelle (34) auf der anderen Seite enthält.

5. Apparat nach Anspruch 4, dadurch gekennzeichnet, daß der Detektor (32) und die Lichtquelle (34) sich jeweils in Längsrichtung des Vorschubpfades so erstrecken, daß der Grad, indem das den Detektor erreichende Licht ausgeblendet wird, eine direkte Funktion der Relativausrichtung ist.

6. Apparat nach Anspruch 5, dadurch gekennzeichnet, daß der Detektor (32) eine sich in Längsrichtung erstreckende Reihe von einzelnen Detektorzellen umfaßt, wobei die Anzahl der Zellen, die zu einem bestimmten Zeitpunkt aktiviert wird, eine direkte Funktion der Relativausrichtung ist.

7. Apparat nach Anspruch 6, dadurch gekennzeichnet, daß eine Endgruppe jeder Reihe von Zellen dazu dient, die Lage und seitliche Ausrichtung der Anschlagstirnseite (18) zu ermitteln.

8. Apparat nach Anspruch 6 oder 7, dadurch gekennzeichnet, daß Zellen in jeder Reihe dazu dienen, die Lage der Vorderkante (14) jedes Druckproduktes (12) relativ zur Lage der Anschlagstirnseite (18) zu ermitteln.

9. Apparat nach Anspruch 6, 7 oder 8, dadurch gekennzeichnet, daß er Zeitsteuerungseinheiten (34) enthält, die im Betrieb auf die Rate reagieren, mit der die aufeinanderfolgenden Zellen jeder Reihe von der sich bewegenden Vorderkante (14) abgedeckt werden, um eine Angabe über die Geschwindigkeit zu liefern, mit der sich das Druckprodukt (12) annähert und/oder mit der es abgebremst wird.

10. Apparat nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, daß die Bremsvorrichtung wenigstens ein Bürstenelement (26) enthält, das auf die Oberseite bzw. die Oberseiten der Druckprodukte (12) im Falzbereich (16) einwirkt, wobei die Reguliervorrichtung zur Einstellung des durch dieses Element bzw. diese Elemente ausgeübten Druckes und damit zur Veränderung der eingesetzten Bremswirkung dient.

11. Apparat nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß die Bremsvorrich-

tung Unterdruckgehäuse enthält, die im Betrieb auf das Druckprodukt (12) im Falzbereich einwirken, wobei die Reguliervorrichtung (36) zur Einstellung des Vakuumniveaus und damit zur Veränderung der eingesetzten Bremswirkung dient.

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12. Apparat nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, daß der Bewegungsbegrenzer (20) und das Schlagelement (24) wahlweise vom Vorschubpfad entfernt gehalten werden können, so daß die Druckprodukte (12) durch die Falzzone (16) transportiert werden können, ohne daß ein Falzen erfolgt, wobei die Positionssensoreinrichtung (32) zur Überwachung ihres Transports durch diese Zone dient.

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#### Revendications

1. Appareil de pliage à action d'appui, comprenant :

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a) un dispositif transporteur (10) destiné à porter, le long d'un chemin d'alimentation, un flux d'éléments imprimés (12) successifs, pré-pliés ou non pliés, à une ou plusieurs feuilles,

b) une butée de tête (20) présentant une face d'aboutement (18), qui peut être placée pour agir sur le dit chemin afin de limiter, le long de celui-ci, le déplacement vers l'avant de chaque élément imprimé (12),

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c) un élément d'appui (24) guidé pour se déplacer de façon oscillante pour venir couper ou dégager le chemin d'alimentation dans une zone de pliage (16) de celui-ci qui se trouve en amont de la face d'aboutement,

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d) deux éléments de pliage (22) déterminant un moyen de pincement immédiatement adjacent à cette zone, qui reçoit et évacue un élément imprimé (12) replié en regard dans le dit moyen de pincement,

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e) un dispositif de commande d'appui qui actionne l'élément d'appui en synchronisme avec l'arrivée de chaque élément imprimé (12) dans la dite zone (16) pour réaliser son pliage ou son pliage supplémentaire en l'introduisant dans le dit moyen de pincement, et

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f) un dispositif de freinage (26) dans la dite zone, destiné à ralentir sensiblement ou à stopper le déplacement vers l'avant de chaque élément imprimé (12) lorsque celui-ci se rapproche de la face d'aboutement (18) ou atteint celle-ci, pour subir l'action de l'élément d'appui (24) ;

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caractérisé en ce que le dit appareil comprend de plus :

g) un dispositif de commande (30) comprenant des moyens capteurs de position (32) disposés dans la zone de pliage (16) ou à côté de celle-ci, qui détectent de façon active les positions relatives de la face d'aboutement (18) et du

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bord (14), en cours d'approche ou à l'arrêt, de chaque élément imprimé successif (12) dans la dite zone, et un dispositif de régulation (36,28) qui règle automatiquement, en fonctionnement, l'effet du dispositif de freinage sur les éléments imprimés (12) en réponse à des lectures des moyens capteurs (32), de façon que l'élément d'appui (24) agisse sur chaque élément imprimé (12) lorsque celui-ci, dans la dite zone (16) se trouve dans une position optimale dans laquelle le bord avant (14) présente avec la face d'aboutement (18) une relation telle que l'élément imprimé (12) ne soit pas endommagé et se trouve plié de façon efficace et précise.

2. Appareil selon la revendication 1, caractérisé en ce que le moyen capteur comprend deux capteurs de position (32) ayant des positions respectives écartées latéralement du chemin d'alimentation et qui, indépendamment, sont sensibles aux positions relatives de parties écartées respectives de la dite face d'aboutement (18) et des bords avant (14) des éléments imprimés.

3. Appareil selon la revendication 2, caractérisé par un dispositif (34) de comparaison automatique des lectures individuelles provenant des dits capteurs de position (32) pour détecter le biaisage.

4. Appareil selon la revendication 2 ou 3 caractérisé en ce que chaque dit capteur (32) comprend un détecteur à infra-rouge placé d'un côté du chemin d'alimentation et une source lumineuse (34) placée de l'autre côté.

5. Appareil selon la revendication 4, caractérisé en ce que le dit détecteur (32) et la dite source lumineuse (34) sont tous deux dans l'axe longitudinal du chemin d'alimentation, de façon que le degré de coupure de la lumière atteignant le détecteur soit une fonction directe de ce dit positionnement relatif.

6. Appareil selon la revendication 5 caractérisé en ce que le dit détecteur (32) comprend une rangée longitudinale de cellules individuelles de détection, le nombre de cellules activées à tout moment étant une fonction directe du dit positionnement relatif.

7. Appareil selon la revendication 6, caractérisé en ce qu'un groupe d'extrémité à chaque rangée de cellules sert à lire la position et l'alignement latéral de la face d'aboutement (18).

8. Appareil selon la revendication 6 ou 7, caractérisé en ce que des cellules de chaque rangée servent à répondre à la position du bord avant (14) de chaque élément imprimé (12) par rapport à la position de la face d'aboutement (18).

9. Appareil selon la revendication 6, 7 ou 8, caracté-  
risé par ce qu'il comprend un dispositif de chrono-  
métrage (34) répondant activement à la vitesse à  
laquelle des cellules successives de chaque ran-  
gée sont assombries par le bord avant (14) en 5  
déplacement, pour fournir une mesure de la vitesse  
d'approche et/ou de la décélération de l'élément  
imprimé (12).
10. Appareil selon l'une quelconque des revendications 10  
précédentes, caractérisé en ce que le dispositif de  
freinage comprend un ou plusieurs éléments à  
brosse (26) agissant sur une ou des faces des élé-  
ments imprimés (12) dans la zone de pliage (16), le 15  
dit dispositif de régulation agissant pour régler la  
pression du ou des dits éléments afin, en fonction-  
nement, de faire varier l'effet de freinage.
11. Appareil selon l'une quelconque des revendications 20  
1 à 9, caractérisé en ce que le dispositif de freinage  
comprend des boîtes d'aspiration d'air qui agissent  
activement sur l'élément imprimé (12) dans la zone  
de pliage (16), le dit dispositif de régulation (36)  
agissant pour régler le niveau de vide appliqué, afin 25  
de faire varier, en fonctionnement, l'effet de frei-  
nage.
12. Appareil selon l'une quelconque des revendications  
précédentes, caractérisé en ce que la butée de tête  
(20) et l'élément d'appui (24) peuvent être mainte- 30  
nus sélectivement hors du chemin d'alimentation  
de façon à pouvoir alimenter en éléments imprimés  
(12) la zone de pliage (16) sans qu'un pliage se  
produise, le dispositif capteur de position (32) ser-  
vant à surveiller leur passage dans cette zone. 35

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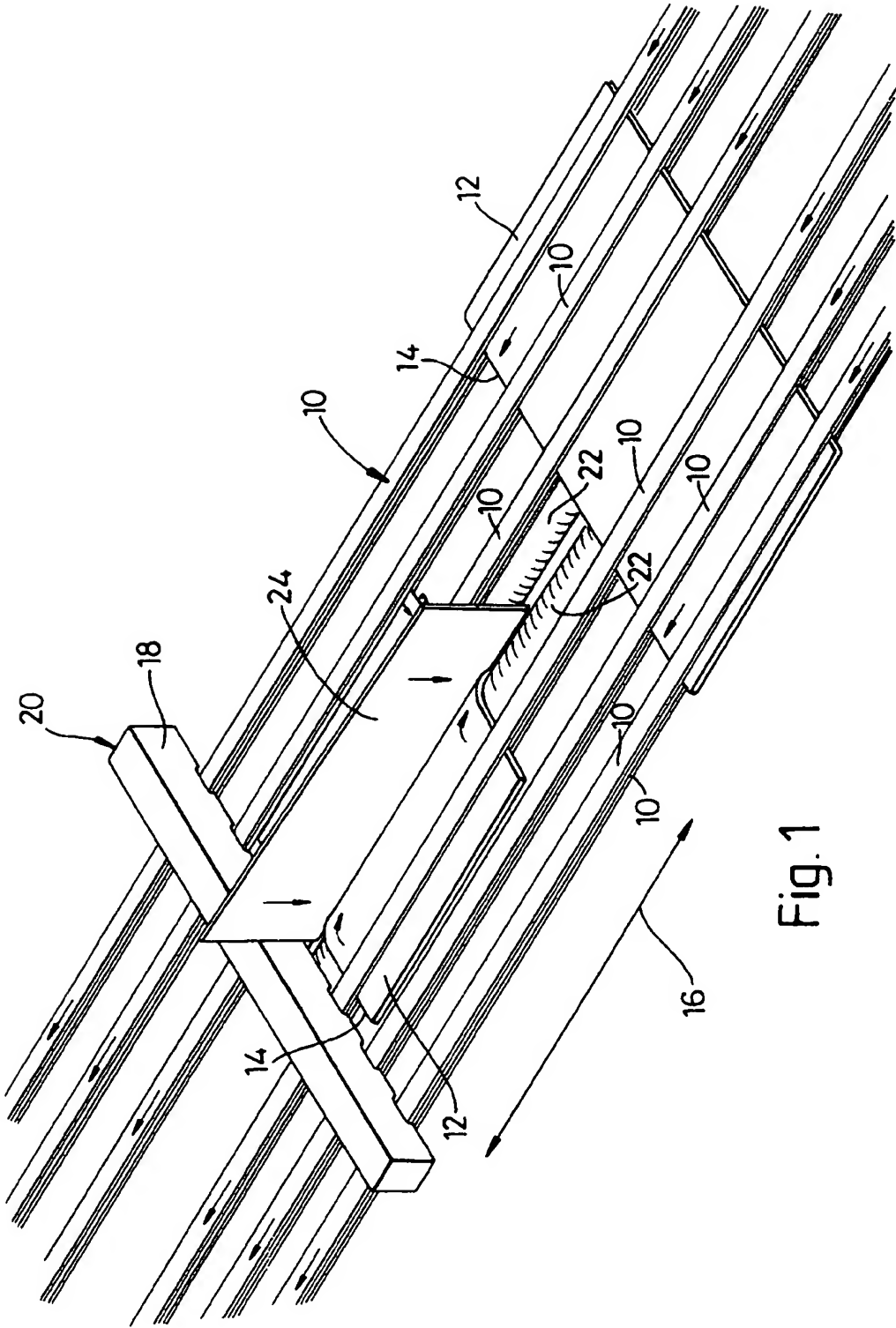


Fig. 1

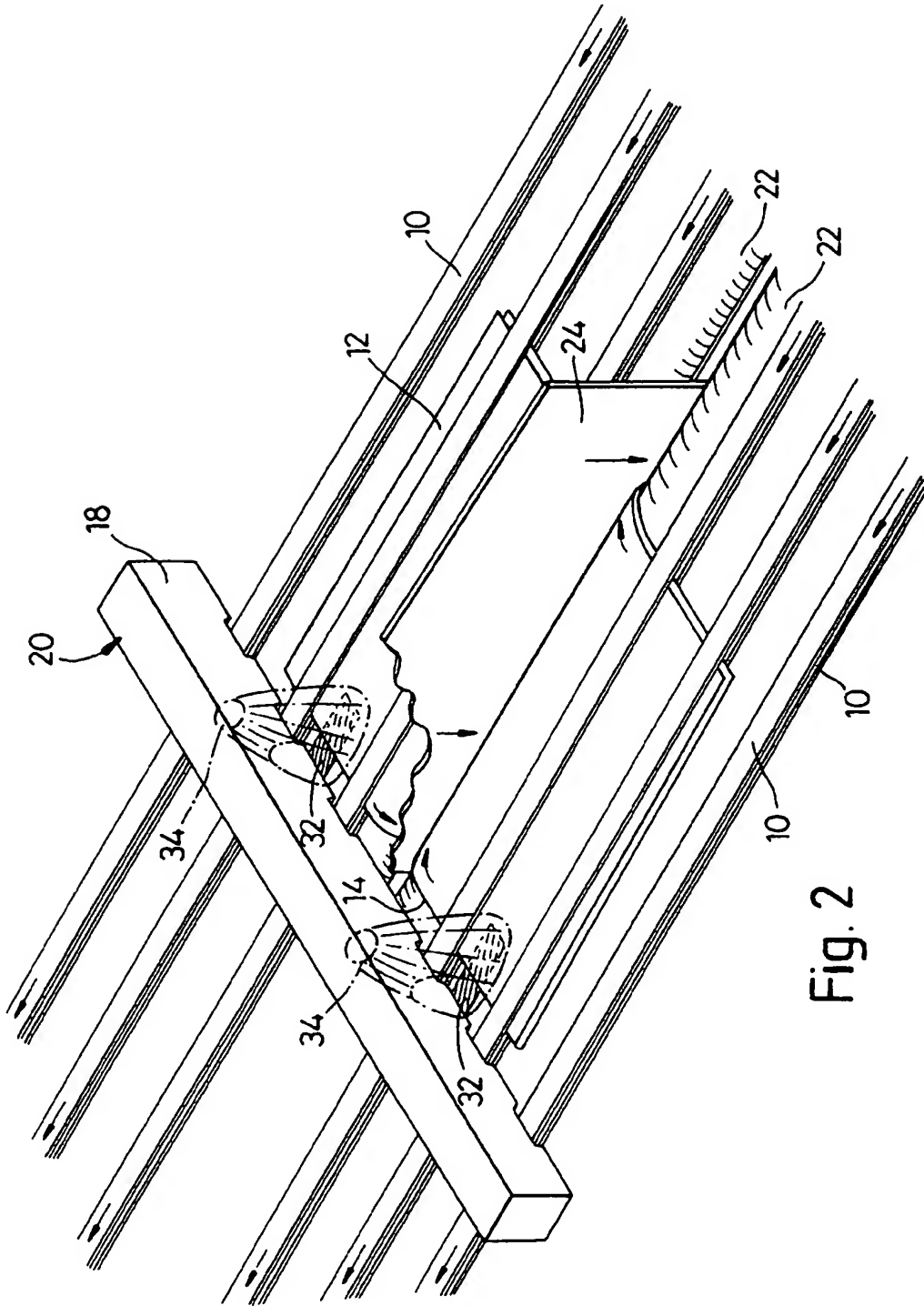


Fig. 2

